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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/665,298	09/17/2003	Michael C. Green	005513P018	5448

7590 06/15/2005

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EXAMINER

LE, THAO X

ART UNIT	PAPER NUMBER
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2814

DATE MAILED: 06/15/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

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Office Action Summary	Application No.	Applicant(s)	
	10/665,298	GREEN ET AL.	
	Examiner	Art Unit	
	Thao X. Le	2814	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 06 May 2005.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-37 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-37 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 06 May 2005 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Drawings

1. The drawings were received on 06 Mar. 2005. These drawings are acceptable.

Claim Rejections - 35 USC § 112

2. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

3. Claims 1-37 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter, which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. The newly added limitation 'one or more of the first and second semiconductor materials forming a film comprising attached halide particles extending along the heterojunction' in claims 1, 17 and 'wherein at least one of the first and the second semiconductor material comprises a substantially solid phase film' in claims 30 and 31.

Claim Rejections - 35 USC § 102

4. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

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A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

5. Claims 1-9, 14, 16-18, 20-37 are rejected under 35 U.S.C. 102(b) as being anticipated or, in the alternative, under 35 U.S.C. 103(a) as obvious over by WO 02/067014 to Harel et al.

Regarding claim 1, Harel discloses a photodetector in fig. 14, comprising: a plurality of semiconductor materials forming a heterojunction, the plurality of semiconductor materials comprising: a first semiconductor material 4; a second semiconductor material 5 coupled to the first semiconductor material 4, the first and second semiconductor materials being halides, page 30 second and third paragraphs, and one or more of the first and second semiconductor material forming a film comprising attached halide particles extending along the heterojunction.

With respect to 'and one or more of the first and second semiconductor material forming a film comprising attached halide particles extending along the heterojunction', layers 4 and 5 of Harel comprise halide material. Therefore, inherently the halide particles in layer 4 and 5 would have extending along the heterojunction 4/5.

Regarding claims 2-4, 18, Harel discloses the photodetector wherein the first and second semiconductor materials have approximately the same band gap, wherein the first semiconductor 4 comprises a lead iodide compound, page 30 line 23 and the second semiconductor material comprises mercuric iodide, page 30 line 28.

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Regarding claim 5, Harel discloses the photodetector further comprising: a first contact (bottom electrode), page 30 line 20; and a second contact 6, page 30 line 32, wherein the first plurality of semiconductor materials are disposed between the first and second contacts.

Regarding claim 6, Harel discloses the photodetector wherein at least one of the first and second contacts comprises palladium, see claims 18 or 19.

Regarding claims 7-9, Harel discloses the photodetector wherein the second semiconductor material comprises mercuric iodide and the first semiconductor material is less chemically reactive than mercuric iodide with the contacts, wherein the first semiconductor material 4 has a thickness about 200 μm , page 31 line 25.

Regarding claims 14, 20, Harel discloses the photodetector further comprises a third semiconductor material comprising lead iodide couples to the second semiconductor material 5, page 31 lines 11-17.

Regarding claims 16-17, Harel discloses the photodetector wherein the second semiconductor material has a conductivity type different than the first semiconductor material, page 31 line 8, wherein the band gap of the first and second semiconductor material are within 10 percent of each other. Although the prior art does not specially disclose the claimed band gap, this feature is seen to be inherently teaching of that limitation because of the material properties.

Regarding claims 21-26, Harel discloses the photodetector wherein at least one of the first and second semiconductor materials comprises iodide compound, page 30 line 28 and wherein the first semiconductor material comprises bismuth iodide, see

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claim 9, wherein the second semiconductor 5 comprises mercuric iodide, page 30 line 28, wherein the first semiconductor layer 4 comprises lead iodide, page 30 line 23.

Regarding claims 27-29, Harel discloses the photodetector is coupled to a negative bias, wherein the first contact is coupled to ground and the second contact is coupled to a negative voltage, fig. 2.

Regarding claim 30, Harel discloses a photodetector in fig. 14, comprising: a first semiconductor material 4; a second semiconductor material 5 coupled to the first semiconductor material forming a heterojunction structure; wherein at least one of the first and the second semiconductor material comprises a substantially solid phase film (to dry at room temperature), page 32 third paragraph, a contact 6 coupled to the second semiconductor material, wherein the first and second semiconductor materials comprise means for reducing a chemical reaction with the contact; and means for reducing dark current in the heterojunction structure.

Harel discloses the structure substantially identical to that of the claims (layer 4 of Harel is a means for reducing a chemical reaction and reducing dark current), claimed properties or functions are presumed to be inherent. *In re Best*, 195 USPQ 430, 433 (CCPA 1977).

Regarding claim 31, Harel discloses a photodetector in fig. 14, comprising: a first semiconductor material 4; and a second semiconductor material 5 coupled to the first semiconductor material; wherein at least one of the first and the second semiconductor material comprises a substantially solid phase film (to dry at room temperature), page 32 third paragraph and a contact 6 coupled to the second semiconductor material 5,

wherein the second semiconductor material is less corrosive than the first semiconductor material to the contact.

Although the prior art does not specially disclose the claimed less corrosive, this feature is seen to be inherently teaching of that limitation because of the material properties.

Regarding claims 32-37, Harel discloses the photodetector wherein the first and second semiconductor materials are halides or iodide, wherein the first and second semiconductor material is lead iodide and mercuric iodide, respectively, page 30 lines 23 and 28, wherein first semiconductor material 4 is bismuth iodide, see claim 9.

Claim Rejections - 35 USC § 103

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

7. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to

consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

8. Claims 10-13, 15, 19 are rejected under 35 U.S.C. 103(a) as being unpatentable over WO 02/067014 to Harel et al.

Regarding claims 10-13, 15, 19 Harel does not disclose the photodetector, wherein the first semiconductor material 4 has a first thickness less than approximately 50 microns, wherein the thickness of the second semiconductor material 5 is thicker than the first semiconductor material 4.

However, Harel discloses the photodetector wherein the first semiconductor material 4 has a thickness about 200 μm , page 31 line 25, and the second semiconductor material 5 has the thickness about 150 μm , page 29 line 29. Accordingly, it would have been obvious to one of ordinary skill in art to use thickness teaching of Harel in the range as claimed, because it has been held that where the general conditions of the claims are disclosed in the prior art, it is not inventive to discover the optimum or workable range by routine experimentation. See *In re Aller*, 220 F.2d 454, 105 USPQ 233, 235 (CCPA 1955).

Response to Arguments

9. Applicant's arguments filed 06 May 2005 have been fully considered but they are not persuasive.

- a. The Applicant argues that Harel does not disclose one or more of the first and second semiconductor material forming a film comprising attached halide particles extending along the heterojunction. This is not persuasive because layers 4 and 5 of Harel comprise halide material. Therefore, inherently the halide particles in layer 4 and 5 would be extending along the heterojunction 4/5.
- b. The Applicant argues that Harel does not disclose at least one of the first and the second semiconductor material comprises a substantially solid phase film. This is not persuasive because the final materials 4/5 are allowed to dry at room temperature, page 32 third paragraph. Thus, it would have comprising a solid phase.
- c. The Applicant apparently argues that the instant applicant uses different methods than Harel to make the semiconductor layers. Even though product-by-process claims are limited by and defined by the process, determination of patentability is based on the product itself. The patentability of a product does not depend on its method of production. If the product in the product-by-process claim is the same as or obvious from a product of the prior art, the claim is unpatentable even though the prior product was made by a different process.”
In re Thorpe, 777 F.2d 695, 698, 227 USPQ 964, 966 (Fed. Cir. 1985), MPEP 2113.
- d. ‘to exclude film of PIB material, it has been held that the use of the term “comprising” leaves a claim open for inclusion of material or steps other than recited in the claims. Ex parte Davis, 80 USPQ 448 (PTO Bd. App. 1948). Use of

the term « comprising » does not exclude the presence of the element. In re Hunter, 288 F. 2d 930, 129 USPQ 25 (CCPA 1961).

Conclusion

10. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

11. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Thao X. Le whose telephone number is (571) 272-1708. The examiner can normally be reached on M-F from 8:00 AM - 4:30 PM.

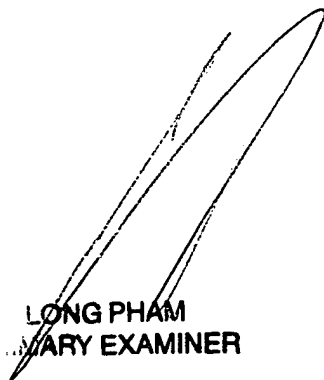
If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Wael M. Fahmy can be reached on (571) 272 -1705. The fax phone

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number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Thao X. Le
06 June 2005



LONG PHAM
PRIMARY EXAMINER



Replacement Sheet

Title: REDUCING DARK CURRENT OF PHOTOCONDUCTOR USING
HETEROJUNCTION THAT MAINTAINS HIGH X-RAY SENSITIVITY

1st Named Inventor: Michael C. Green

Application No.: 10/665,298

Sheet 1 of 3

Docket No.: 5513P018

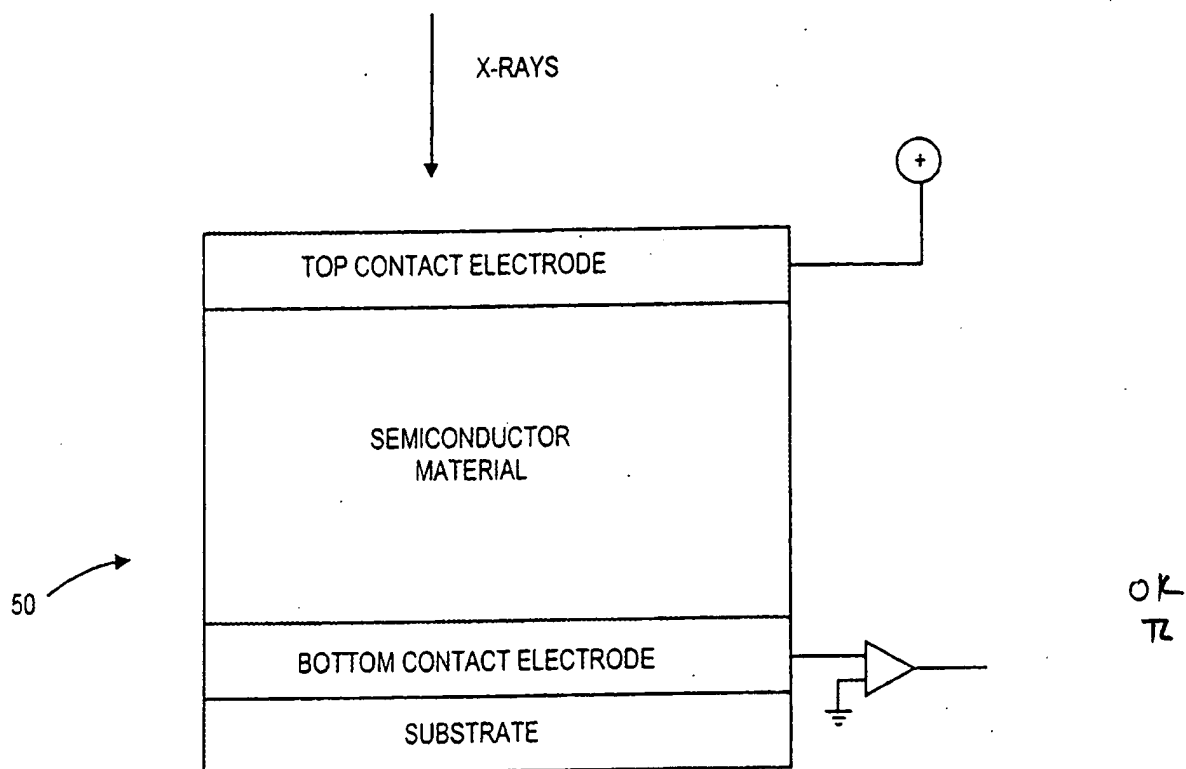


FIG. 1A

PRIOR ART

Replacement Sheet

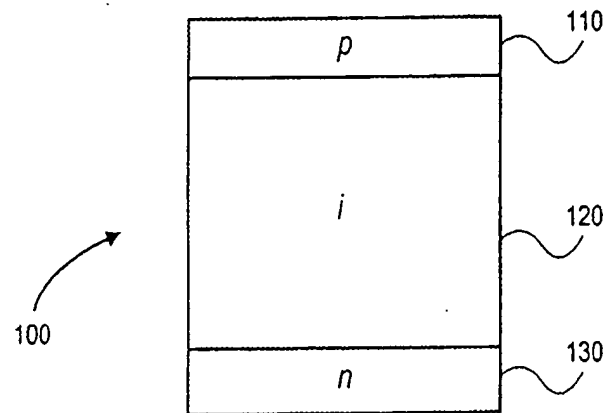
Title: REDUCING DARK CURRENT OF PHOTOCONDUCTOR USING
HETEROJUNCTION THAT MAINTAINS HIGH X-RAY SENSITIVITY

1st Named Inventor: Michael C. Green

Application No.: 10/665,298

Sheet: 2 of 3

Docket No.: 5513P018



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FIG. 1B

PRIOR ART

Replacement Sheet

Title: REDUCING DARK CURRENT OF PHOTOCONDUCTOR USING
HETEROJUNCTION THAT MAINTAINS HIGH X-RAY SENSITIVITY

1st Named Inventor: Michael C. Green

Application No.: 10/565,298

Sheet 3 of 3

Docket No.: 5513P018

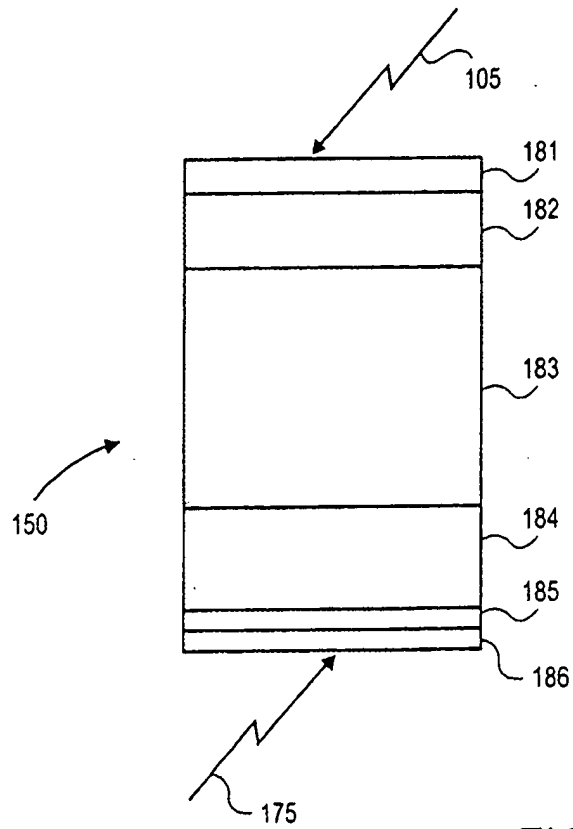


FIG. 1C

PRIOR ART

OK
TZ